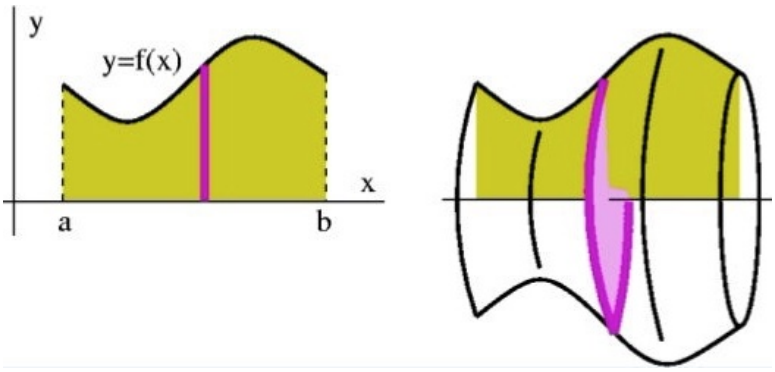
## 7.2a Notes and Examples

Name: Block: Seat:

*Volumes of Revolutions*

Revolving a region around a line forms a solid whose cross-section is a circle.




So the Volume is computed based upon $\pi r^2$, the area of a circle:

Disk Volume

$$\text{Disk Volume} = \pi \int_a^b [R(x)]^2 \, dx \text{ or } \pi \int_c^d [R(y)]^2 \, dy$$

Washer Volume

$$\text{Washer Volume} = \pi \int_a^b [R(x)]^2 - [r(x)^2] \, dx \text{ or } \pi \int_c^d [R(y)]^2 - [r(y)^2] \, dy$$

1. Intro slides (Video at Mathorama Podcast)
   (a) Find the volume of the solid formed by revolving the region bounded by the $x$-axis, $y = \sqrt{x}$, and $x = 4$ around the the line $y = 0$ (the $x$-axis)

   (b) Find the volume of the solid formed by revolving the region bounded by the graphs of $f(x) = 2 - x^2$ and $g(x) = 1$ about the line $y = 1$

(c) Find the volume of the solid formed by revolving the region bounded by the $y$-axis, $y = \sqrt{x}$ and $y = -2$ about the line $x = 0$ (the $y$-axis)

2. Go to Class 3-17 Examples (7.2a) at `https://deltamath.com`

(a) Match the shaded region to the solid formed by revolving it around a line (There are six). How many did you get right?

(b) Let the region $R$ be the area enclosed by the function $f(x) = e^x$, the $x$-axis and the vertical lines $x = 0$ and $x = 2$. Find the volume of the solid generated when the region $R$ is revolved about the $x$-axis. You may use a calculator and round to the nearest thousandth.

(c) Let the region $R$ be the area enclosed the function $f(x) = \sqrt{x}$, the horizontal line $y = 1$, and the $y$-axis. Find the volume of the solid generated when the region $R$ is revolved about the line $y = 1$. You may use a calculator and round to the nearest thousandth.

(d) Let the region $R$ be the area enclosed the function $f(x) = e^x$, and $g(x) = 4x + 1$. Find the volume of the solid generated when the region $R$ is revolved about the $x$=axis. You may use a calculator and round to the nearest thousandth.

(e) Let the region $R$ be the area enclosed the function $f(x) = \sqrt{2x}$, the horizontal line $y = 2$, and the $y$-axis. Find the volume of the solid generated when the region $R$ is revolved about the line $y = 5$. You may use a calculator and round to the nearest thousandth.

(f) Find the volume of the solid obtained by rotating the region bounded by $x = 2 - y^2$ and $x = -y$ about the line $x = 7$. Round to the nearest thousandth.